

Modbus registers for 550 to 580 series conversion

Crossover list of common read-only Modbus registers

When converting from a 550 to a 580 series drive where Modbus is used to monitor the drive there are two options for determining compatibility between the new drive and existing Modbus controller. The first option is to review a feature in the 580 series drive called “Modbus backwards compatibility mode” which is detailed in Technical Note 021. The second option is to adjust the Modbus registers numbers in the Modbus controller to match the new 580 series drive. The 550 series consists of the ACH550, ACQ550, and ACS550 drives. The 580 series consists of the ACH580, ACQ580, and ACS580 drives.

Modbus backwards compatibility mode allows the 580 series drive to look like its predecessor drive, the 550 series, when registers are read or written to over Modbus RTU. This compatibility mode detailed in Technical Note 21 however has two limitations. First not all the 550 series parameters are replicated in the 580 series drive, and second it eliminates access to 580 series specific parameters over Modbus. Some new 580 series parameters provide enhanced information that was not available on the 550 series drive, that may be desirable to access over Modbus. This Technical Note 062 provides a guide for converting common 550 series Modbus registers to 580 series Modbus registers, and notes on how to get equivalent or similar data resolution.

16 bit

The 550 series drive parameters were 16 bit only. The ACx580 drive has some parameters that are 16 bit, and some that are 32 bit. Even though some parameters are 32 bit, the parameter can still be accessed with a 16 bit read and write command. For accessing most parameters over Modbus in the 550 and 580 series drives using 16 bit read/write commands, the Modbus register number is equivalent to using the drive parameter number with the number four in front of the parameter number. For example, 580 series drive parameter 01.06 is Output frequency. The 16 bit Modbus register for parameter 01.06 is 40106.

32 bit

The Modbus register numbers for 32 bit reads of 580 series drive parameters requires some math to covert the parameter number to a register number. This math is also dependent on the setting of parameter 58.33 (Addressing mode). This document assumes parameter 58.33 = 0 (default setting), which allows for both 16 or 32 bit read/write of parameters. The math equation for converting a 580 series drive parameter to a 32 bit Modbus register is: $420000 + (200 \times \text{parameter group}) + (2 \times \text{parameter index})$. For example, parameter 01.06 would be $420000 + (200 \times 01) + (2 \times 06) = 420212$. The addressing mode setting of parameter 58.33 = 0, allows for one 580 series register to read as 16 bit, and another read as 32 bit without having to adjust any drive settings.

The following two tables list common read-only parameters and register numbers for the 550 series

and the equivalent new parameter and register number in the 580 series drive. Table 1 lists information for reading registers in the 580 series as 16 bit. Table 2 lists information for reading registers in the 580 series as 32 bit.

There are differences in the returned values over Modbus between 16 bit and 32 bit reads, and what math is required to covert the value to a usable number. The notes column for each chart details the equations to convert the returned decimal number into a value that matches the drives control panel, or provides instructions on specific 580 series drive parameters that will need to be reviewed and possibly adjusted to obtain the desired returned value.

Table 1: 16 bit 550 registers to 16 bit 580 registers

550 series			580 series			
Register Number	Name	Units or Scaling	Register Number	Name	Units or Scaling	Notes for equivalence to ACH550 16 bit read
40101	Speed & Direction	rpm, 1 rpm	40101	Motor Speed used	0 – 20,000	Divide returned value by 20,000 and multiply by the value set in parameter 46.01. Default value for parameter 46.01 is 1800 rpm. Adjust 46.01 value to motor name plate value.
40102	Speed	rpm, 1 rpm	40102	Motor speed estimated	0 – 20,000	Divide returned value by 20,000 and multiply by the value set in parameter 46.01. Default value for parameter 46.01 is 1800 rpm. Adjust 46.01 value to motor name plate value.
40103	Output frequency	Hz, 0.1	40106	Output frequency	0 – 20,000	Divide returned value by 20,000 and multiply by the value set in parameter 46.02. Default value for parameter 46.02 is 60.0 Hz.

550 series			580 series			
40104	Output current	Amps, 0.1	40107	Motor current	Default resolution 1 Amp	<p>If parameter 46.05 is equal to default value of 10000, returned value is a whole number with no decimals.</p> <p>If drive is rated for 65 Amps or less set P46.05 = 100, which will return a value with resolution of 0.01 Amps. Take returned value and divide by 100.</p> <p>If drive is rated for greater than 65 Amps set parameter 46.05 = 1000, which will return a value with resolution of 0.1 Amps. Take returned value and divide by 10.</p>
40105	Torque	%, 0.1	40110	Motor torque	%, 0.01	Divide returned value by 100.
40106	Output power	kW, 0.1	40114	Output power	kW, 0.1	Divide returned value 10.
40107	DC bus voltage	VDC, 1 V	40111	DC voltage	VDC, 0.1 VDC	Divide returned value by 10.
40109	Output voltage	Volts, 1 V	40113	Output voltage	Volts, 1 V	No math required.
40110	Drive temp	°C, 0.1	40511	Inverter temperature	%, 1	100% = drive fault on overtemp, no conversion ratio to °C.
40113 ¹	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	40622	HVAC status word	bits: 0 (Hand) 1 (Off) 2 (Auto)	Only one bit 0 - 2 will be "1" at a time indicating the control location.
40113 ²	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	40622	Hand-off-auto status word	bits: 0 (Hand) 1 (Off) 2 (Auto)	Only one bit 0 - 2 will be "1" at a time indicating the control location.
40113 ³	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	40616	Drive status word 1	Bits: 8 (Local) 10 (Ext 1) 11 (Ext 2)	If bit 8 = "1" then drive in local mode, otherwise drive is in remote mode.
40114	Run time	hours	40503	Hours run	Whole hours	Rounded whole numbers returned, no math.
40115	kWh counter	kWh	40120	Inverter kWh counter	kWh, 0.1	Divide returned value by 10.

550 series			580 series			
40303	FB STS word 1	Bits	P06.11 = 40611 P06.16 = 40616 P06.17 = 40617 P06.18 = 40618 P06.19 = 40619 P06.20 = 40620 P06.21 = 40621 P06.22 = 40622	Status words	Bits	There is not direct equivalent 580 series register for 550 series register 303. Review what bits in 550 series drive parameter 0303 are important, and identify the equivalent bits of information in 580 series drive parameters 06.11 - 06.22. (Par. 06.22 does not exist in ACS580)
40304	FB STS word 2	Bits	P06.11 = 40611 P06.16 = 40616 P06.17 = 40617 P06.18 = 40618 P06.19 = 40619 P06.20 = 40620 P06.21 = 40621 P06.22 = 40622	Status words	Bits	There is not direct equivalent 580 series register for 550 series register 304. Review what bits in 550 series drive parameter 0304 are important, and identify the equivalent bits of information in 580 series drive parameters 06.11 - 06.22. (Par. 06.22 does not exist in ACS580)
40305	Fault word 1	Bits	40440	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40306	Fault word 2	Bits	40440	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40307	Fault word 3	Bits	40440	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.

550 series			580 series			
40308	Alarm word 1	Bits	40440	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40309	Alarm word 2	Bits	40440	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40401	Previous fault 1	Fault Code	40411	Last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.
40412	Previous fault 1	Fault Code	40412	2nd to last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.
40413	Previous fault 2	Fault Code	40413	3rd to last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.

¹ACH580 register conversion

²ACQ580 register conversion

³ACS580 register conversion

Table 2: 16 bit 550 registers to 32 bit 580 registers

550 series			580 series			
Register Number	Name	Units or Scaling	Register Number	Name	Units or Scaling	Notes for equivalence to ACH550 16 bit read
40103	Output frequency	Hz, 0.1	420212	Output frequency	Hz, 0.01	Divide returned value by 100.
40104	Output current	Amps, 0.1	420214	Motor current	Amps, 0.01	Divide returned value by 100.
40105	Torque	%, 0.1	420220	Motor torque	%, 0.1	Divide returned value by 10.
40106	Output power	kW, 0.1	420228	Output power	kW, 0.01	Divide returned value by 100.
40107	DC bus voltage	VDC, 1 V	420222	DC voltage	VDC, 0.01 VDC	With 2.15 firmware or newer read register 420222, otherwise set parameter 58.107 = Parameter 01.11, 32 bit integer. Read register 400007 as a 32 bit read. Divide returned result by 100.
40109	Output voltage	Volts, 1 V	420226	Output voltage	Volts, 1 V	No math required.
40110	Drive temp	°C, 0.1	421022	Inverter temperature	%	Divide returned value by 10. 100% = drive fault on overtemp, no conversion ratio to °C.
40113 ¹	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	421244	HVAC status word	bits: 0 (Hand) 1 (Off) 2 (Auto)	Only one bit 0 - 2 will be "1" at a time indicating the control location.
40113 ²	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	421244	Hand-off-auto status word	bits: 0 (Hand) 1 (Off) 2 (Auto)	Only one bit 0 - 2 will be "1" at a time indicating the control location.
40113 ³	Ctrl location	0 = Local 1 = Ext1 2 = Ext2	420832	Drive status word 1	Bits: 8 (Local) 10 (Ext 1) 11 (Ext 2)	If bit 8 = "1" then drive in local mode, otherwise drive is in remote mode.
40114	Run time	hours	421006	HVAC status word	bits: 0 (Hand) 1 (Off) 2 (Auto)	Only one bit 0 - 2 will be "1" at a time indicating the control location
40115	kWh counter	kWh	420240	Inverter kWh counter	kWh, 1	No math required

550 series			580 series			
40303	FB STS word 1	Bits	P06.11 = 421222 P06.16 = 421232 P06.17 = 421234 P06.18 = 421236 P06.19 = 421238 P06.20 = 421240 P06.21 = 421242 P06.22 = 421244	Status words	Bits	There is not direct equivalent 580 series drive register for 550 series drive register 303. Review what bits in 550 series drive parameter 0303 are important, and identify the equivalent bits of information in 580 series parameters 06.11 - 06.22. (Par. 06.22 does not exist in ACS580)
40304	FB STS word 2	Bits	P06.11 = 421222 P06.16 = 421232 P06.17 = 421234 P06.18 = 421236 P06.19 = 421238 P06.20 = 421240 P06.21 = 421242 P06.22 = 421244	Status words	Bits	There is not direct equivalent 580 series drive register for 550 series drive register 304. Review what bits in 550 series drive parameter 0304 are important, and identify the equivalent bits of information in 580 series parameters 06.11 - 06.22. (Par. 06.22 does not exist in ACS580)
40305	Fault word 1	Bits	420880	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40306	Fault word 2	Bits	420880	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40307	Fault word 3	Bits	420880	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.

550 series			580 series			
40308	Alarm word 1	Bits	420880	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40309	Alarm word 2	Bits	420880	Event word 1 parameters	Bits	Manual adjustment of drive parameters 04.41 - 04.71 is required so parameter 04.40 (Event word 1) represents the correct faults and warnings for the application. Review drive firmware manual for further information.
40401	Previous fault 1	Fault Code	420882	Last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.
40412	Previous fault 1	Fault Code	420824	2nd to last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.
40413	Previous fault 2	Fault Code	420826	3rd to last fault	Fault Code	Convert returned value to Hex, and compare to the drive manual fault list.

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